Amendments To The Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1. (previously presented) An imaging system comprising:

an ultrasound console having a serial input;

an interferometer comprising a multi-element photo detector, having a plurality of parallel outputs, wherein the multi-element photo detector is configured to detect the light intensity of an interference pattern, and

a parallel to serial converter electrically coupling the plurality of parallel outputs of the multi-element photo detector to the serial input of the ultrasound console, wherein the ultrasound console processes data provided by the interferometer to form an image for display.

Claims 2-3 (canceled)

4. (original) The imaging system of claim 1, wherein the ultrasound console further comprises a second input and the system further comprises an ultrasound device with an output coupled to the second input.

5. (original) The imaging system of claim 1, wherein the interferometer comprises a catheter.

6. (previously presented) The imaging system of claim 4, wherein the ultrasound device comprises a catheter.

Claim 7 (canceled)

8. (previously presented) The imaging system of claim 1, wherein the ultrasound console is configured to process analog serial data and the parallel to serial converter is adapted to provide analog serial data to the ultrasound console.

9. (previously presented) The imaging system of claim 1, wherein the ultrasound console is configured to process analog serial data and the parallel to serial converter is adapted to provide digital serial data to the ultrasound console.

10. (previously presented) The imaging system of claim 1, wherein the interferometer comprises two multi-element photo detectors, each comprising a plurality of parallel outputs coupled to the parallel to serial converter.

11. (original) The imaging system of claim 1, wherein the interferometer further comprises:

a light source;

means for creating a sample light beam and a reference light beam from light from the light source;

means for conveying the sample light beam to a sample;

means for introducing a time delay into at least one of a second sample light beam received from the sample and the reference light beam; and

means for combining the second sample light beam with the reference light beam to form a combined light beam for detection by the detector.

12. (original) The imaging system of claim 11, wherein the means for combining the second sample light beam and the reference light beam is a beam splitter.

13. (original) The imaging system of claim 11, wherein the means for introducing a time delay and the means for combining the second sample light beam and the reference light beam is a diffraction grating.

14. (original) The imaging system of claim 11, wherein:

the means for introducing a time delay is a diffraction grating that introduces the time delay to the reference light beam; and

the means for combining the second sample light beam and the reference light beam is a beam splitter.

15. (original) The imaging system of claim 11, wherein the means for forming the sample and reference light beams is a first beam splitter and the means for combining the second sample light beam and the reference light beam is a second beam splitter.

16. (previously presented) The imaging system of claim 1, wherein the interferometer further comprises:

a low coherence light source;

a first beam splitter in communication with the light source to split light from the light source into a sample light beam to be directed onto a sample and a reference light beam;

a diffraction grating in communication with the first beam splitter to receive the reference light beam from the first beam splitter and to diffract the reference light beam; and

a second beam splitter positioned to receive a reflected sample light beam from the sample, the second beam splitter being in communication with the diffraction grating to receive the diffracted reference light beam, wherein the reflected sample light beam and the diffracted reference light beam are combined in the second beam splitter to form a combined light beam; and

a detector positioned to receive the combined light beam from the second beam splitter.

17. (original) The imaging system of claim 16, wherein at least one of the first beam splitter and the second beam splitter is a non 50/50 beam splitter.

18. (previously presented) The imaging system of claim 17, wherein:

the first beam splitter is an approximately 50/50 beam splitter; and

the second beam splitter directs more than half of the light energy in the reflected sample light beam into the combined beam and directs less than half of the light energy in the reference light beam into the combined beam.

19. (previously presented) The imaging system of claim 18, wherein the second beam splitter directs substantially more than half of the light energy in the reflected sample light beam into the combined light beam and directs substantially less than half of the light energy in the reference light beam into the combined beam.

20. (original) The imaging system of claim 19, wherein the diffraction grating is a reflective diffraction grating, a transparent diffraction grating or an acousto optic modulator.

Claim 21 (cancelled)

22. (original) The imaging system of claim 17, wherein the first beam splitter directs more than half of the light energy received from the light source into the sample light beam and less than half of the light energy received from the light source into the reference light beam.

23. (previously presented) The imaging system of claim 22, further comprising an optical circulator, wherein the sample light beam is directed to the sample through the optical circulator and the reflected sample light beam is directed to the second beam splitter through the optical circulator.

24. (original) The imaging system of claim 23, wherein the second beam splitter directs substantially more than half of the light energy received from the light source into the sample light beam and substantially less than half of the light energy received from the light source into the reference light beam.

25. (previously presented) The imaging system of claim 24, wherein the second beam splitter is an approximately 50/50 beam splitter and the reflected sample light beam and the reference light beam are combined in the second beam splitter to form first and second combined light beams, the first light beam being detected by the first detector; and

the interferometer further comprises a second detector to detect the second light beam.

Claim 26 (cancelled)

27. (previously presented) The imaging system of claim 1, further comprising a focusing lens to focus the sample light beam onto the sample and to focus the reflected sample light beam.

28. (previously presented) An imaging system comprising:

an ultrasound console having an input;

an interferometer comprising:

a low coherence light source;

a first fiber optic beam splitter;

a first optical path optically coupling the light source to the first beam splitter, wherein the first beam splitter splits light received from the light source into a sample light beam and a reference light beam;

a second optical path optically coupling the first beam splitter to a sample and coupling a reflected sample light beam from the sample to the first beam splitter;

a second beam splitter;

a third optical path optically coupling the first beam splitter to the second beam splitter to convey the reflected sample light beam, at least in part, from the first beam splitter to the second beam splitter;

a diffraction grating;

a fourth optical path optically coupling the first beam splitter to the diffraction grating to convey the reference light beam, at least in part, to the diffraction grating;

wherein the second beam splitter is positioned to receive the diffracted reference light beam and the reference light beam and the reflected sample light beam are combined in the second beam splitter to form a combined light beam; and

a multi-element photo detector having a plurality of parallel outputs, the multi-element photo detector being positioned to receive the combined light beam;

the system further comprising a parallel to serial converter comprising a plurality of inputs, each input being coupled to a respective one of the plurality of outputs of the detector, to convert the parallel data output by the plurality of outputs of the detector into serial data,

the parallel to serial converter having an output coupled to the input of the ultrasound console to provide the serial data to the ultrasound console to process into an image.

29. (original) The imaging system of claim 28, wherein:

the first beam splitter is an approximately 50/50 beam splitter; and

the second beam splitter directs more than half of the light energy received from the

light source into the sample light beam and less than half of the light energy received from the light source into the reference light beam.

30. (original) The imaging system of claim 29, further comprising a catheter and an optical fiber within the catheter, wherein the second optical path is optically coupled to the optical fiber within the catheter.

31. (previously presented) The imaging system of claim 28, further comprising a focusing lens, wherein the second optical path optically couples the first beam splitter to the focusing lens, to focus the sample light beam onto the sample and to focus the reflected sample light beam.

32. (previously presented) An imaging system comprising:

an ultrasound console having an input;

an interferometer comprising:

a low coherence light source;

a first fiber optic beam splitter;

a first optical fiber optically coupling the light source to the first beam splitter, wherein the first beam splitter splits light received from the light source into a sample light beam and a reference light beam;

an optical circulator having a first port, a second port and a third port, wherein light input to the first port exits the optical circulator from the second port and light entering the second port exits the optical circulator from the third port;

a second optical fiber optically coupling the first beam splitter to the first port of the optical circulator;

a third optical fiber optically coupling the second port of the optical circulator to a

sample and optically coupling a reflected sample light beam from the sample to the second port;

a second beam splitter;

a fourth optical fiber optically coupling the third port of the optical circulator to the second beam splitter, wherein the third optical fiber conveys the reflected sample light beam, at least in part, from the third port to the second beam splitter;

a diffraction grating;

a fifth optical fiber optically coupling the first beam splitter to the diffraction grating to convey the reference light beam, at least in part, to the diffraction grating;

the second beam splitter being positioned to receive the diffracted reference light beam from the diffraction grating, wherein the reference light beam and the ~~second~~ reflected sample light beam combine in the beam splitter to form a combined light beam; and

a multi-element photo detector positioned to receive the combined beam, the multi-element photo detector having a plurality of parallel outputs; and

the system further comprising a parallel to serial converter comprising a plurality of inputs, each input being coupled to a respective one of the plurality of outputs of the detector, to convert the parallel data output by the plurality of outputs of the detector into serial data,

the parallel to serial converter having an output coupled to the input of the ultrasound console to provide the serial data to the ultrasound console to process into an image.

33. (original) The imaging system of claim 32, wherein the light received from the light source has an energy and the first beam splitter splits the light into a sample light beam having more than half of the energy of the light and a reference light beam having less than half of the energy of the light.

34. (previously presented) The imaging system of claim 33, wherein the second beam splitter is an approximately 50/50 beam splitter and the reflected sample light beam and the reference light beam are combined in the second beam splitter to form first and reflected sample light beams, wherein the first combined light beam is received by the first multi element photo detector; and

the interferometer further comprises a second multi-element photo detector positioned to receive a second combined beam from the second beam splitter, the second multi-element photo detector comprising a plurality of parallel outputs coupled to the parallel to serial converter.

35. (original) The imaging system of claim 34, further comprising a catheter and an optical fiber within the catheter, wherein the third optical fiber is optically coupled to the optical fiber within the catheter.

36. (original) The imaging system of claim 32, further comprising a catheter and an optical fiber within the catheter, wherein the third optical fiber is optically coupled to the optical fiber within the catheter.

37. (previously presented) The imaging system of claim 32, further comprising a focusing lens to focus the sample light beam from the third optical fiber onto the sample and to focus the reflected sample light beam into the third optical fiber.

Claims 38-40 (cancelled)

41. (new) An imaging system comprising:

an ultrasound console having a serial input;

an interferometer comprising:

a multi-element photo detector, having a plurality of parallel outputs,

a low coherence light source,

a first beam splitter in communication with the light source to split light from the light source into a first sample light beam to be directed onto a sample and a reference light beam,

a diffraction grating in communication with the first beam splitter to receive the reference light beam from the first beam splitter and to diffract the reference light beam,

a second beam splitter positioned to receive a reflected sample light beam from the sample, the second beam splitter being in communication with the diffraction grating to receive the diffracted reference light beam, wherein the reflected sample light beam and the diffracted reference light beam are combined in the second beam splitter to form a combined light beam, and

a detector positioned to receive the combined light beam from the second beam splitter; and

a parallel to serial converter electrically coupling the plurality of parallel outputs of the multi-element photo detector to the serial input of the ultrasound console, wherein the ultrasound console processes data provided by the interferometer to form an image for display.

42. (new) The imaging system of claim 41, wherein at least one of the first beam splitter and the second beam splitter is a non 50/50 beam splitter.

43. (new) The imaging system of claim 42, wherein:

the first beam splitter is an approximately 50/50 beam splitter; and

the second beam splitter directs more than half of the light energy in the reflected sample light beam into the combined beam and directs less than half of the light energy in the reference light beam into the combined beam.

44. (new) The imaging system of claim 43, wherein the second beam splitter directs substantially more than half of the light energy in the reflected sample light beam into the combined light beam and directs substantially less than half of the light energy in the reference light beam into the combined beam.

45. (new) The imaging system of claim 44, wherein the diffraction grating is a reflective diffraction grating, a transparent diffraction grating or an acousto optic modulator.

46. (new) The imaging system of claim 42, wherein the first beam splitter directs more than half of the light energy received from the light source into the sample light beam and less than half of the light energy received from the light source into the reference light beam.

47. (new) The imaging system of claim 46, further comprising an optical circulator, wherein the sample light beam is directed to the sample through the optical circulator and the reflected sample light beam is directed to the second beam splitter through the optical circulator.

48. (new) The imaging system of claim 47, wherein the second beam splitter directs substantially more than half of the light energy received from the light source into the sample light beam and substantially less than half of the light energy received from the light source into the reference light beam.

49. (new) The imaging system of claim 48, wherein the second beam splitter is an approximately 50/50 beam splitter and the reflected sample light beam and the reference light beam are combined in the second beam splitter to form first and second combined light beams, the first light beam being detected by the first detector; and the interferometer further comprises a second detector to detect the second light beam.